

Charles Darwin and Hawaiian Sex Ratios, or, Genius is a Capacity for Making Compensating Errors

John H. R. Plews

I. DARWIN'S LETTER TO STALEY

The following letter is found in the collection of the Hawaiian Historical Society:

January 13 '74
Down
Beckenham, Kent

My Lord:

I hope that you will forgive the liberty which I take in addressing you. From your interesting article on the Sandwich Isls in the *Geograph. Journal* 1868, I have thought that you would perhaps be so good as to give me some information if in your power.

Firstly, it seems generally admitted that the natives have largely decreased since the time of Cook, & what I especially want to know is whether a statement which I have seen quoted from Mr. Bishop (I believe a missionary) is correct, viz that the women of late years have become decidedly less fertile, and that a vy large proportion of the children which are born die early.

Secondly, I suppose no census has ever been taken, so that the proportion between the males & females cannot be told. But if there is reason to believe that males are in considerable excess over females, I shd much like to learn whether it is true that in old time female infanticide was much practiced; so that mothers which bore several daughters used to kill a considerable proportion of them, as has been the habit with so many savages. Whether or not you can spare time & are inclined to assist me, I trust that you will forgive my intrusion—With much respect.

I remain your Lordships' [sic]
Obedient servant
Charles Darwin

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Darwin's handwriting was at times "almost illegible, sometimes even to himself" while that of his son and amanuensis, Francis, provoked the admonition "You'd better try and write well, as it's to a foreigner".¹ I made the foregoing transcription and then compared it with a typescript copy in Hawaiian Historical Society and found they agree, except that the typescript transcriber shows some of the "the"s as "t".² The date of the letter is clear, except for the first digit of the abbreviated year, which looks like "6" corrected to "7" in the same black ink, the result looking very like "8". Charles Darwin died April 19, 1882. The choice between 1864 and 1874 depends chiefly on identifying the addressee and his article.

The date of the article is also unclear. It appears to have originally been written "1863", with the "3" corrected in blue (pencil?) to read "1868". The envelope has not been preserved, and the letter contains no internal address. However, the folder in which the Hawaiian Historical Society preserves the letter says that it is addressed to Bishop Staley.³ The salutation "My Lord" and the conclusion indicate it is addressed to a lord or bishop. An article by Bishop Staley was published in the *Journal of the Royal Geographical Society* for June 1868. Darwin's *The Descent of Man* was published February 24, 1871, and a second edition in "autumn" 1874.⁴ The first edition does not, but subsequent ones do, contain extended discussions of the Hawaiian population, in which Darwin cites "Bishop Staley".⁵ It is therefore almost certain that the letter is dated January 13, 1874, is written to Bishop Staley and refers to the bishop's article.

II. WHAT DARWIN SAID ABOUT HAWAII

Darwin's remarks on the Hawaiian population focus first on the familiar fact of the drastic decrease in the number of Hawaiians, and the decline in fertility as shown by the small number of children.⁶ These phenomena are well known, and Darwin's discussion follows familiar lines, requiring little comment except on two points. Darwin says that "the most potent of all the causes seems to be lessened fertility", as opposed to "profligacy", wars, severe labor (i.e. during the sandalwood trade of the 1820's) or even lack of resistance to introduced diseases. The other point is that Darwin accepts 300,000 as a rough estimate of the population in 1779, rather than the 400,000 estimated by Capt. James King in *Cook's Third Voyage*.⁷ If 400,000 is correct, the rate of decline abated somewhat in the second half of the century following Cook, whereas if 300,000 is correct, it continued unabated for a full century. For instance, in 1832, the Hawaiian population was 124,049, plus 400 foreigners.⁸ In 1884, there were 44,232 persons of Hawaiian ancestry in

Hawaii (including 4,218 part Hawaiians)⁹ a reduction of 64% in 52 years. If the 1779 population was 400,000, there was a 69% reduction in the 53 years 1779–1832. If the 1779 population was 300,000, there was a 59% reduction.

Darwin later¹⁰ turns to a far less familiar point, that the Hawaiians, like other “savages” whose population declined sharply upon the incursion of civilized people, showed a considerable excess of males over females. Using figures for certain districts which happened to be differentiated (I will not fall for the old chestnut “broken down”) by age and sex, Darwin computed “4,723 males and 3,776 females; that is a ratio of 125.08 to 100”, and 1,797 boys to 1,429 girls, a ratio of 125.75 to 100.

Darwin noted similar sex ratios among the Todas, an aboriginal people in India, and the Maori of New Zealand. He weighed the possibility that if the prevailing practice in a society was to kill female infants, the survivors might have a tendency to produce more females than males, and found it unconvincing.

From the several foregoing cases we have some reason to believe that infanticide practiced in the manner above explained, [i.e. killing only, or more, girls than boys] tends to make a male-producing race; but I am far from supposing that this practice in the case of man, or some analogous process with other species, has been the sole determining cause of an excess of males.¹¹

This was a special aspect of the problem presented Darwin by his acceptance of the almost unanimous belief in “blending inheritance”, “which held that the characters of offspring struck an average between those of the two parents”.¹² On this theory, any variation in a single individual, no matter how advantageous, would be utterly swamped as succeeding generations of that individual’s progeny mated with the vast number of its species who did not have that variation.

One of the great ironies of intellectual history was that an obscure Augustinian abbot, Gregor Mendel, had discovered the solution, and even published it in 1865, in a paper which specifically pointed out that his mathematical discoveries about the inheritance of smooth and wrinkled peas showed that variant characteristics were not invariably blended back into the mass, but would persist and even proliferate generation after generation in a hybrid population.¹³ This explains how the predominant tendency of natural selection is to keep species close to a standard model, while at the same time permitting the perpetuation of some variation until that mutation does some harm and is extinguished, or does some good and proliferates. For instance, suppose a gene protecting humans against tuberculosis mutated in Hawaiians so as to be ineffective centuries before Cook. Its spread among the Hawaiian

population would do not harm until the tuberculosis bacteria was introduced. Unfortunately, neither Darwin nor other members of the world's intellectual establishment learnt of Mendel's discovery until 1900,¹⁴ eighteen years after Darwin's death.

Blending inheritance had to make a special case of sex determination. It was obvious that the mating of men and women does not normally produce hermaphrodites, and that men do not produce more men and women more women. In fact, each alone produces nothing. It not only takes two to tango, but they must be one of each. As each baby is produced by one male and one female, the usual rule of like producing like does not apply to sex determination, for each baby is produced by an equal combination of unlikes.

The foregoing paragraph attempts to explain the fallacy in terms of the common experience available in Darwin's time. It may be objected that Darwin's greatness lay in questioning common sense. But in this instance, developments in genetics have confirmed common sense. Any beginning college text on biology will inform us that a woman is female because she has two X chromosomes, one derived from each parent, and passes on one of them to each of all her children; whereas, a man is male because he has one X chromosome from his mother, and one Y from his father; he passes on X to some children, who become girls, and Y to the others, who become boys. These beginning texts point out that this means that "The male determines the sex of the offspring but he has no control over it. It is a 50-50 chance whether an X-bearing or Y-bearing sperm fertilizes the X-bearing egg."¹⁵ But that general statement is somewhat qualified in several ways. For instance, there are abnormal combinations of sex chromosomes, XXX, XXY (about 1 in 500 births) and XYY (about 1 in 300).¹⁶ Moreover, it is normal for male births to "outnumber female births by five percent or so, producing a slight surplus of males that eventually disappears as a result of higher male death rates".¹⁷ Finally, there is precisely the phenomenon Darwin discusses, the great excess of males in the Todas, Maoris and Hawaiians. In other words, there is normally a slight but consistent departure from random distribution of the sexes, and 19th century Hawaiians, Maoris and Todas are of particular interest in showing large departures under similar circumstances.

Darwin having, as quoted above, scouted the idea that past infanticide of females would be the "sole determining cause of an excess of males" was left with an enigma, "There may be some unknown law leading to this result [i.e. "excess of males"] in decreasing races, which have already become somewhat infertile."¹⁸

III. WAS DARWIN RIGHT ABOUT HAWAII? INFANTICIDE

One other possible deficiency in the infanticide hypothesis is that not only is its prevalence in Hawaii a controversial question, but there is scant evidence that it was directed primarily at females. Furthermore, Darwin's statement that "The practice of infanticide ceased about the year 1819" is literally wrong.¹⁹ Is it substantially wrong; did infanticide persist to such an extent and for such a time as to account for the statistics? The Rev. William Ellis, cited by Darwin²⁰ as showing that Hawaiian infanticide "was by no means confined to females, as is shown by Mr. Ellis, and as I have been informed by Bishop Staley and the Rev. Mr. Coan", devotes several pages to infanticide.²¹ He begins with a horrific account in which a tenant of John Young, quarrelling with his wife, seized their "fine little boy" and "broke its back across his knee, and then threw it down in expiring agonies before her". Young arrested him and brought him before Kamehameha for punishment. The King said that since the child was the accused's own son, "neither you nor I have any right to interfere; I cannot say anything to him". Ellis goes on to estimate that two-thirds of the children were killed, but asserts that in 1823, Kuakini, governor of the island of Hawaii, forbade infanticide, and other chiefs did likewise, but it was "still practiced, particularly in remote districts". In all this, he said nothing about females being the chief victims. Only much later does he recur to the subject, in the following brief paragraph:

The number of males is much greater than that of females in all the islands, in consequence of the girls being more frequently destroyed in infancy, as less useful than the males for purposes of war, fishing, etc. We do not know the exact proportion here; but in the Society Islands, in all our early schools, the proportion of girls to boys was as three to four, or four to five, though since the abolition of infanticide the numbers are equal.²²

In the earlier passages, Ellis had claimed numerous informants, even naming two, Kuakini explicitly, and Maaro implicitly. This passage might be based on such evidence, but it looks as if Ellis' belief is founded simply on the excess of males. If that is all, proving the fact of female infanticide by reference to the sex ratio, and explaining the sex ratio by reference to that "fact" is circuitous logic. It may be internally consistent, but lacks real observed evidence. Moreover, it is inconsistent with his earlier explanation of the reason for infanticide being "idleness", the simple desire to rid themselves of children who would be trouble to raise, a reason equally applicable to boys and girls until they were old enough to be useful. Moreover, he clearly includes abortion in the term infanticide, when he says that several methods "frequently proved fatal to the mother".

The Rev. Hiram Bingham asserted that "more than half the children were destroyed during the generation preceding the introduction of Christianity", that he had information from many mothers who killed many of their children, but implied that as of 1830, infanticide had ceased, and says nothing to indicate that infanticide was aimed primarily at females. He also introduces to print what may be called the rescue motif, naming two persons who had been taken as *hanai* (foster children) to save them from death.²³

Anyone wishing to discount the prevalence of infanticide may argue that Ellis and Bingham's statements are generalized. This cannot be said, however, of Laura Fish Judd's account of a meeting of the women of the church at which, of the many childless mothers "very few" "had lost children by a natural death", and one confessed to killing eight children. After the meeting, "my native woman" told her that she was the only one of ten children her mother had spared, but had rescued her youngest brother after he had been buried alive and ran away with him.²⁴

Neither Bingham nor Mrs. Judd say anything about infanticide being aimed primarily at females, and both imply that by 1830 its prevalence was past.

Infanticide is mentioned by Artemas Bishop as a former cause of depopulation. He is explicit that in 1838 "The laws since enacted have made the crime to be murder, and seem to have put an effectual stop to the practice" and says nothing to suggest it was aimed primarily at females.²⁵

In 1846, Foreign Minister Wyllie asked the Protestant Mission to have the individual missionaries answer 113 questions as to their districts. None gave present infanticide as a cause of depopulation, although some "unskillful management of children" (Rev. E. W. Clark) or "want of proper care of children . . . proper food, clothing, protection of the weather . . . medicine and medical skill" (Rev. R. Armstrong) was spoken of. The Rev. D. B. Lyman said that in the opinion of the most intelligent natives, infanticide does sometimes occur but proof was lacking. The Rev. A. Bishop said it was "nearly or quite suppressed", but suspected some abortion. The others "reply in the negative".²⁶

Darwin's other cited authority, Jarves, adds little. His account of infanticide is simply a synopsis of Ellis.²⁷

David Malo's article "On the decrease of population on the Hawaiian Islands" in *The Hawaiian Spectator*, Vol. 2 p. 121, is divided in two. Pages 121-4 are devoted to ancient causes of depopulation, including infanticide, or at least abortion.

Even the unborn child did not escape, but was put to death for mothers, thinking they should prematurely become old women without having gained property, pierced their unborn, and thus many a child was destroyed before it was born. Others, from the time of conception to the birth of the child made it their business to extinguish its life.²⁸

Pages 125–130 are devoted to the then present causes of depopulation, not including infanticide. Indeed, Malo's point is that the venereal and other foreign diseases, and the lack of care by the chiefs of the people, were reducing the population far worse than the former wars, murders, etc.

The Hawaiian historians mention infanticide only slightly, in most cases incidentally to some other topic. For instance, Malo's and Kepe-lino's discussion of the small hereditary group of outcast slaves, the *kauwā*, assert that the offspring of *kauwā* with chiefs²⁹ and commoners³⁰ were killed at birth. Kamakau does mention it briefly as a cause of depopulation, saying "Their reasons for killing the child were age, poverty, pleasure seeking, illicit relations, jealousy, slavery, dislike of children, and shame". While he speaks (in translation) in the past tense, he adds it is "still made use of today",³¹ but adds that "These country women do not try to do away with their children".³² Similarly, Pogue's collection (or conflation) of Lahainaluna history papers says "Infanticide was carried on by those who sought only pleasure".³³ None of the Hawaiian historians say infanticide was mostly of girls.

Much more recently, Mary Pukui asserts that infanticide was not prevalent at the time of which she was writing, generally her childhood and the generation or two before i.e. the latter half of the 19th century. She knows no stories of children destroyed by lazy pleasure-loving mothers, and points out that children were valued. Children of chiefs with commoners, and children of *kauwā* or "any child whose sire was regarded as worthless trash by the relatives of the mother" were killed. She mentions that her husband's aunt adopted a child to prevent its being killed, and that her grandmother pretended that her child was not by a man "greatly despised by the grandparents" who would have killed it.³⁴

It is possible that infanticide was especially prevalent among the numerous hangers-on of great *kapu* chiefs. John Ii, at the age of ten, became a retainer of the young Liholiho, after very careful training by his family, yet he recounts two incidents when his dropping a spittoon cover and coughing while watching a ceremony nearly resulted in his death. His brother, Maoloha, had been killed for some such fault, and the wrath of Kamehameha against another boy relative, Kalapauahiole, was such that it was only by the family's previous record and the intercession of others that the "things held by Papa and his people [were]

spared".³⁵ Having children in the neighborhood of a great chief was obviously hazardous for child and family under the *kapu* system. Ellis got his facts about infanticide from chiefs.³⁶ Laura Judd's mothers' meeting included Kaahumanu, Kinau and their followings. Bingham stayed close to the seat of power. It is possible these missionaries' impression of the former prevalence of infanticide was true of this class but not of the population as a whole.

It appears that in Cook's time, population pressure was severe. If King's estimate were correct, or even if, as appears nearer the truth, should be reduced by 25%, the result shows that every island, except Oahu, completely supported a larger resident population than it does today, when most food, clothing and building materials are imported, and every county government seeks to slow population growth.³⁷ Under such pressure, far more severe than mere idleness or pleasure seeking, it may well have been that all forms of infanticide were recognized as the right of the family which otherwise would have the burden of raising the child. It is, after all, on similar reasoning that the United States Supreme Court has decided that a mother has the sole right to decide to have an abortion precisely because she alone will otherwise have to carry and give birth to it.³⁸ The population declined by half before the arrival of the missionaries, but social institutions do not disappear the moment the need for them dwindles. Thus Kamehameha, in Ellis's account³⁹ still recognized the right. On his death, direct concern about depopulation, and the abolition of the *kapu* system created a climate of opinion in which the missionaries' advice to forbid infanticide was acceptable.

In summary, the evidence is that infanticide including abortion was prevalent before the 1820's, abated to a clandestine level thereafter, and there is scant evidence, perhaps merely a rationalization of the sex ratio itself, that it was practiced mostly on females.

IV. DARWIN'S ARITHMETIC

Darwin's use of statistics provides light relief from this gloomy topic. He took them from Jarves,⁴⁰ whose Appendix VII gave tables showing the number of men, women, girls and boys for four districts covering all Kauai in 1839 or 1840, the district of Ewa, Oahu in 1840, and one of the same districts on Kauai in 1841. On Kauai, the boys and girls are broken down into "Taxable" and those under 14; on Oahu, those under 18.⁴¹ The figures are given in Table I, the raw figures being taken from Jarves, the totals and ratios being computed by myself.⁴²

TABLE I

ADULTS

<i>Kauai 1839</i>	<i>Men</i>	<i>Women</i>	<i>Ratio</i>
(1) Wawapuhi [sic] to Kealia	905	732	123.63
(2) Kapaa to Kepu [sic]	536	396	135.35
(3) Kipu to Wahiawa	490	384	127.60
(4) Hanapepe to Nualolo	853	701	121.68
Sub-total	2784	2213	125.80
<i>Oahu 1840</i>			
Ewa	1105	878	125.85
Sub-total	3889	3091	125.82
<i>Kauai 1841</i>			
(4) Hanapepe to Nualolo	834	679	122.83
Total	4723	3770	125.28

Darwin purported to give the total of Kauai for 1839 plus Ewa, Oahu for 1840 as "4723 males and 3776 females; that is in the ratio of 125.80 to 100".⁴³ Only if the figures for (4) Hanapepe to Nualolo, Kauai in 1841 are added in as well, does the total come to 4723 males, and 3770 females. Evidently, Darwin included Hanapepe to Nualolo twice, once for 1839 and once for 1841, and added the females wrong. As the Kauai figures are only two years apart, they included almost the same people, a serious double counting. However, since the double-counted district was the one with the lowest sex ratio, and it was the females who were under-totalled, the result was that Darwin's ratio of 125.08 was slightly less significant than the true one of 125.82.⁴⁴

For boys and girls, Darwin purported to add the children under 14 on Kauai in 1839 to those under 18 in Ewa, Oahu in 1840, and arrived at a total of males "1797, and of females 1429, and here we have the ratio of 125.75 males to 100 females".⁴⁵ His probable purpose in calculating a separate ratio for children was to get as close to the ratio at birth as the available figures allowed. The figures, taken once again from Jarves, with totals and ratios by myself, are given in Table II. (The figures in parentheses are explained later).

TABLE II
CHILDREN

<i>Kauai 1839</i>	<i>Boys</i>	<i>Girls</i>	<i>Ratio</i>
(1)	309	277	111.55
(2)	155	154	100.65
(3)	30 (132)	132 (129)	22.73 (102.33)
(4)	353	264	133.71
Sub-total	847 (949)	827 (824)	102.42 (115.17)
<i>Ewa, Oahu 1840</i>	491	318	154.40
Sub-total	1338 (1440)	1145 (1142)	116.86 (126.09)
(4) <i>Kauai 1841</i>	359	284	126.41
Total	1697 (1799)	1429 (1426)	118.75 (126.16)

Once again, there is double counting of the Hanapepe to Nualolo District by including its 1839 and 1841 censuses. This time the error is serious; for as far as children go this district has the highest sex ratio on Kauai. The actual sex ratio shown by Jarves' figures for Kauai in 1839 is a mere 102.42. Even if Ewa 1840 is included, it is still only 116.86. The double counting, bringing it up to 118.75, exaggerates the facts as shown by Jarves. Worse yet Darwin added the boys up wrong, and came to a total of 1797 instead of 1697. This gave him a ratio 125.75 to 100, almost the same as the 125.08 he computed for adults.⁴⁶

Darwin himself complained of his weakness in mathematics.⁴⁷ The classic example is that he did not, as Mendel did, recognize that his figures on crossing two strains of snapdragons showed that the first generation all showed the characteristics of one strain, but when their progeny crossed with each other, the next generation had three of that strain's characteristics to one of the other.⁴⁸ To my weak mathematical sense, the fact that these ratios are all they had to go on is more a tribute to Mendel's mathematical perspicacity than proof of Darwin's obtuseness, but even I can realize that there is something out of line in Jarves' figures for Kipu to Wahiawa, reproduced in Table III.

TABLE III
JARVES' FIGURES FOR KIPU TO WAHIAWA, 1839

Taxable men	409
" women	384
" boys	17
" girls	30
Boys under fourteen	30
Girls " " "	132
Men having three or more children	
Women " " " " "	
Old men	75
Old women	94
	<hr/> 1352

The fact that the figure for boys under fourteen is out of all proportion to like girls, and is exactly the same as that for taxable girls which appears immediately above it, suggests a printer's error. Also, the printed total is not the total of the printed figures.

Fortunately, Schmitt, *The Missionary Censuses of Hawaii*, Pacific Anthropological Records No. 20, (Bishop Museum, 1973) pp. 40-41 tells us there is a discrepancy between Jarves' figures and those in the *Polynesian* for August 15, 1840 p. 39, and shows those from the latter. The *Polynesian* shows that there were 132 boys under 14 and 129 girls under 14. These figures have been inserted in Table II and the ratios recalculated (both in parentheses). The important figures are not the total, but the last sub-total, which is that of Kauai in 1839 plus Ewa, Oahu in 1840. That is what Darwin purported to be adding. Including the Nualolo to Hanapepe figures on the last line, the grand total would include its population twice.

The result is that Darwin:

1. Took data including an obvious typographical error;
2. Included a double count of the people of one district;
3. Added it up wrong, so that;
4. These large errors arrived at a ratio of 125.75 boys to 100 girls, a discrepancy of 0.34 less than the true ratio of 126.09. Genius must be the ability to make compensating errors.

V. WHY DID THE CLERGY HELP DARWIN?

Darwin, of course, was regarded by some clergy as "the most dangerous man in England".⁴⁹ This was not merely hot-gospel fundamentalism. Paley's *Natural Theology* used the supposedly perfect adaptation of each species to its environment as proof that they must have been designed by an all wise Creator. In an age when until recently ordination as a priest of the Church of England was a pre-requisite for almost any teaching post at Oxford or Cambridge, many intellectuals made Paley's theory fundamental in their thought, for it not only reconciled their two vocations, but proved "that the study of natural history inevitably led to a belief in a divine Creator."⁵⁰ Paley's works were on the syllabus of every theological student. Indeed Darwin's *Autobiography* implies Paley's works were all he had to read to pass his examinations as a theological student. Late in life, Darwin told his children, "I did not at that time trouble myself about Paley's premises; and taking these on trust, I was charmed and convinced by the long line of argumentation".⁵¹ Darwin's observations showed that not all species are perfectly adapted (for instance an introduced species may wipe out an indigenous one) and his

central thesis showed how each species could evolve into something reasonably well adapted to its environment without divine creation.

Darwin's leading clerical opponent was the Rt. Rev. Samuel Wilberforce, whose attempts to ridicule Darwin on scientific grounds before a scientific audience not only had the ridicule turned in his face, but left the impression that if that was the best answer the church had to offer, Darwin might well be right.

It is curious that two of Darwin's three informants about the Hawaiian population should be clergy. One, "the Rev. Mr. Coan"⁵² was probably the Rev. Titus Coan, a missionary in Hilo.⁵³ But the Protestant mission to Hawaii seems to have been quite relaxed about evolution. Many were acute students of botany and geology. The wife of Coan's Hilo colleague, Sarah Lyman, published a scientific article in *Silliman's Journal*, a record of earthquakes involving a primitive precursor of the Richter scale, based on the amount of crockery smashed.⁵⁴ Nobody could say that the children of the Rev. Peter Gulick, all of whom became missionaries, were not sternly disciplined in the strictest views. John Thomas Gulick, a twenty-year old student at Punahou saw the arrival of the ship on which his brother, Luther, was returning after an absence of at least five years. It was Sunday morning. John, of course, rode down to greet his long lost brother and new sister-in-law as they disembarked—the next day. Apparently such a reunion was sufficient excuse to cut classes, but not the Sabbath.⁵⁵ Yet the next year he was prepared to lecture the Punahou Debating Society on land shells, comparing the extreme localization of each species to Darwin's description of the creatures of the Galapagos in the *Voyage of the Beagle*. (*The Origin of Species* was six years in the future.) In fact, a good part of the lecture was Darwin rehashed; but Gulick's conclusion was his own:

"We have no reason to doubt that these shells were originally created in the valleys where we now find them and have been there ever since, whether it be for one thousand or ten thousand years."⁵⁶

Gulick grew up to be a respected author on evolution, a minister and missionary. He visited Darwin in 1872, but their discussion seems to have been confined to Hawaiian shells, not humans.⁵⁷

The Rev. Titus Coan, in his own book, *Life in Hawaii* (1882) quotes Darwin only for a description of Polynesian scenery (from the *Beagle*), but his remark "It may be surprising to some to be told, that the sudden and great changes brought on by civilization check the population"⁵⁸ seems to echo Darwin's in the *Descent of Man*.

What is even more surprising is Bishop Staley's help. Staley owed his bishopric chiefly to his fellow High Churchman of liberal politics, the Bishop of Oxford, Samuel Wilberforce, Darwin's would-be nemesis.⁵⁹

Staley arrived in Honolulu on October 11, 1862⁶⁰ some five months after Wilberforce had signed his preface to Manley Hopkins *Hawaii, the Past, Present and Future of its Island Kingdom*. That work was evidently aimed at drumming up support in England for Staley's mission. Its author and introducer seem to have given little thought or care to the reaction that would be produced in Hawaii by its argument that 40 years' work by the Protestant mission had produced only superficial Christianity and done nothing to check Hawaiian depravity. Its chapter on depopulation suggested that the Protestants had largely despaired of any moral regeneration of the Hawaiians, remarking that "Mr. Coan gives as a cause [of depopulation] 'the mysterious will of God' ".⁶¹ Wilberforce's preface, speaking of "an English alliance" and a "branch" of "our" Church could only confirm the suspicions of those who saw Staley's mission as primarily designed to counteract American influence.⁶² Wilberforce's fulsome tactlessness did not sit well even with those predisposed to welcome Staley. My great-grandmother, Josephine King, and her father, G. F. Wundenberg were devoted Anglophiles and Anglicans, but their copy bears the pencilled words "Soapy Sam" below the printed signature "S. Oxon", which is itself evidence of obtuseness. While it is the customary formula for the official signature of English bishops, its use was one more irritant to Hawaii's Congregationalists, when the name of Wilberforce would have struck a responsive chord in their abolitionist hearts. Staley was dogged by bad luck, chiefly the death of Kamehameha IV, but not least in the arrival of the young man who was honing the weapons that would make him America's sharpest satirist. Mark Twain found the perfect target of opportunity in "Mr. Staley, my Lord Bishop of Honolulu—who was built into a Lord by the English Bishop of Oxford and shipped over here with a fully equipped 'Established Church' in his pocket" and proceeded to pillory him at merciless length.⁶³ His criticism of Staley's arrogance and pretentiousness, his lack of respect for the Protestant mission, and even his liturgical elaboration, could all accurately be aimed at Hopkin's and Wilberforce's remarks. Nothing but total repudiation of their sentiments by Staley could reconcile him with opponents, and total repudiation was something which as an Englishman and a High Churchman would have betrayed his deepest loyalties. He had every reason to feel that Hopkins and Wilberforce had introduced him to Hawaii in the most undiplomatic way, and may well have been disenchanted with hopping onto Wilberforce's bandwagon.

Paley's theory that adaptation of species to their environment was proof of a divine plan disquieted only those who also took into account the works of the Rev. Thomas Malthus, for this combination showed

that the divine plan involved much cruelty not just among lesser animals, but also to man.⁶⁴ In Victorian Britain, which ruled the waves, and in a contemporary America of seemingly limitless potential, this deduction may have seemed an intellectual quibble to be complacently ignored. To the likes of Rev. Titus Coan, burying twice the hundreds they baptised, it was an ever recurring cause for distress. His supposed attribution of Hawaiian depopulation to "the mysterious will of God" was orthodox Paleyism carried to its logically necessary conclusion, however distressing, but it also sounds like his missionary brethren quoting *Job* 1:21 on the death of their children. Darwin's demonstration of Paley's error by showing that the creation and extinction of species proceeded from natural causes may have been unacceptable to scholarly clergymen in destroying Paley's theory that their science proved their faith. To such as Titus Coan, it was comforting news that they could blame nature, and were not required to bless a God of infinite love, for the mysterious extinction of most of the flock they believed He had sent them to save.⁶⁵

VI. WAS DARWIN RIGHT ABOUT HAWAII?—OTHER CENSUSES

Do other and later statistics bear out Darwin's analysis? Roughly contemporary with Darwin's are the other fragmentary data from the period 1831-5 in Schmitt, *The Missionary Censuses of Hawaii*.⁶⁶ These are curious. On Oahu the ratios were (in males per 100 females): Honolulu: adults 112.2, children 117.5; rest of the island: adults 110.2, children 113.2. However, on Maui the figures are almost even: adults 100.4, children 99.5. Also remarkable is that children were 32.2 percent of Maui's population, contrasted with 19.3% on Kauai, 21.7% in rural Oahu and 15.9% in Honolulu. But things were not quite so good in Lahaina. While the adult ratio was 96.32, that for children was 111.44, and children were 28.45% of the population.⁶⁷

Thus, scarcity of children and a high proportion of boys seem to correlate with each other, and be particularly prevalent in Lahaina and Honolulu in 1831 and 1832. Figures by sex are not available for Kauai in 1831-2. The 1839 (or 1840) figures for Kauai cannot be reliably compared, because the date is several years later, and because the age used to distinguish children from adults varied from census to census, from 12 to 14 to 18.⁶⁸ Thus the fact that in 1839 (or 1840) 26.19% of the population were children under 14 cannot be compared with the earlier figures. The sex ratio of 125.85 in adults and 115.17 can be, but it is uncertain whether the comparison reflects a difference or similarity between Kauai and the other islands, or between 1831-2 and 1839-1840. The fact that Kauai's 1839 (or 1840) child sex ratio was like Honolulu's, rural Oahu's and Lahaina's 7 to 9 years earlier and unlike rural Maui's

may reflect a spreading trend. Ewa, Oahu's in 1840 was 154.40, much higher than the others.

One more thing can be learnt. The preservation of detailed figures for the northern part of Kauai in 1835⁶⁹ and 1847 enables us to focus on one or two truly rural areas. The 1835 figures give no breakdown by sex, and do not specify the age used to distinguish children from adults. In Hanakoa, there were 10 children to 38 adults, or 20.8% of the total. In Kalalau there were 16 children to 115 adults, or 12.2% of the total. These are both low in comparison to the district as a whole (Kalalau through Kealia) which showed 582 children to 2536 adults, or 22.9% of the total, but in the absence of any age standard, these comparisons are meaningless. A single census taker may have his own unexpressed, even impressionistic, standard of what is a child which he applies consistently, but it is unlikely that this wide district was actually counted by a single person.

Fortunately, the most detailed early census report, taken in the spring of 1847, covers this district.⁷⁰ This shows "Kalalau" which probably includes the whole of Na Pali coast. Its figures, compared to the district as a whole are shown in Table IV.

TABLE IV

	<i>Kalalau</i>		<i>Kalalau through Kealia</i>	
	<i>M.</i>	<i>F.</i>	<i>M.</i>	<i>F.</i>
Under 5	14	14	157	126
5-10	10	16	146	116
10-20	15	12	153	157
sub-total	39	42	456	399
sex ratio	92.86		114.29	
20-30	17	15	182	172
30-40	15	13	202	250
40-50	8	6	240	187
50-60	7	6	171	164
60-70	5	1	100	84
Over 70	12	4	55	36
sub-total (over 20)	64	45	950	893
sex ratio (over 20)	142.22		106.38	
Total	103	87	1406	1292
Children as percentage of total	42.6		31.7	

Kalalau, and its neighboring valleys in Na Pali coast were inaccessible even on horseback until 1858.⁷¹ There were no anchorages, so access, other than scrambling down 3000 foot precipices, was by canoe alone. It was a community rarely visited by foreigners, perhaps an occasional missionary, where infanticide could flourish free from prying eyes. The

statistics indicate it did not, and was certainly not aimed at females. Girls outnumbered boys, and there was a ratio of 81 children under 20 to 40 women aged 20 to 60.⁷² The fact that there were 54 children under 10, twice as many as between 10 and 20, may indicate renewed fertility or a drop in infant mortality. Three births (and one death) would indicate very little infant mortality if we could be sure that the period for which they are reported is a full year.

What little can be learned of population movements seems to indicate that the "natural" sex ratio would have been even higher. For instance, a substantial number of Hawaiian men were at sea on whalers and other ships, estimated at 400 in 1832, 600 in 1836, 3,500 in 1848 and 4,000 in 1850.⁷³ Schmitt points out that the last figure is almost 12 percent of the males over 18. Two caveats are in order. A straight line interpolation between the 600 in 1836 and the 3,500 in 1848 would exaggerate those absent in 1839 and 1840. Whalers visiting Hawaii were a relatively stable 138 ± 60 in 1824–1842, and suddenly sky-rocketed from 172 in 1842, to 383 in 1843, and 596 in 1846.⁷⁴ Also, a considerable number of Hawaiian sailors were probably under 18. Before entering his teens, David Farragut had nearly three years experience at sea, including command of a prize ship during which he quelled the attempt of her former captain to resume command.⁷⁵

There was also some movement of women, but within Hawaii, from rural districts to the ports, but the statement of the *Polynesian* for Jan. 10, 1846 (p. 142 c. 2–3) that "other parts of the islands are almost drained of females from ten to twenty years of age" is editorial hyperbole in an age of uninhibited journalism. The actual figure for the Hanalei district in 1847 in the 10–20 age bracket is 153 males to 157 females.⁷⁶ Comparison with other age brackets, i.e. 303 males and 242 females under 10; 182 males and 172 females aged 20–30; 202 males and 250 females aged 30–40; 240 males and 187 females aged 40 to 50; and 171 males and 164 females aged 50 to 60, shows a great dearth of both males and females in the 10–20 bracket, and a substantial one in the 20–30 bracket. This can be explained by boys and young men shipping out and the girls and young women seeking the bright lights of Honolulu. Yet it is in Honolulu, its environs and Lahaina that males especially predominated. Perhaps more men went there to ship out than succeeded in signing on, perhaps returning Hawaiian seamen did not want to go back to the taro *lo'i* "after they'd seen Paree", and found Honolulu a happy medium, Hawaiian but sophisticated. In any event, what glimmerings we do have of the degree of movement of Hawaiians within and out of Hawaii, far from explaining the excess of males shown by the figures used by Darwin,

suggest that these figures actually understate the excess of males of Hawaiian ancestry.

In later years,⁷⁷ published census reports show age and sex breakdowns for the total population. They also show the racial composition of the total, but no age or sex breakdown within racial groups. However, in 1860, Hawaiians and part-Hawaiians were 96.1% of the population, and 93.3% in 1866. It was only thereafter that contract labor began to bring in large numbers of males. Thus the sex ratios until 1866, and for under 15's in 1872 and 6-15 in 1878 probably approximate those for Hawaiians and part-Hawaiians combined. (Because the contract immigrants were predominantly male, their children would be few or part-Hawaiian). These approximations are as follows:⁷⁸

TABLE V
SEX RATIOS IN LATER CENSUSES OF ALL ISLANDS

1849	total population	109.05
	under 17	112.03
	17-29	110.06
	30-49	111.06
	50+	102.09
1850	total population	110.09
	under 18	125.04
1853	total population	113.06
1860	total population	116.09
1866	total population	120.41
	under 15	109.60
1872	under 6	108.47
	6-15	116.35
1878	6-15	122.17

From then on, this approximation is not possible, the population being too diverse. Only in 1900 and after are figures readily available.⁷⁹ In 1900, among Hawaiians aged 4 and under, the sex ratio was 106.69 boys to 100 girls; 101.71 in 1910; and 97.53 in 1920. Thus between 1900 and 1910, the sex ratio came within the normal range, and this is the same decade in which the total population of Hawaiian ancestry swung from continuous decrease to continuous increase.⁸⁰

In summary, these comparisons show that roughly contemporary censuses showed an almost even sex ratio on Maui (except Lahaina) and on the island of Hawaii (as far as one can tell from the "*kane*", "*wahine*", "*keiki*" breakdown used on Hawaii). Later island wide censuses show sex ratios while never quite as high as the Kauai and Oahu figures for 1839-40 used by Darwin, were nevertheless much higher than normal

throughout the 19th century. Thus the census that happened to fall, via Jarves, into Darwin's hands, was an extreme example of a very real phenomenon.⁸¹

VII. CONCLUSION

What caused the "excess of males"? Darwin attributed Hawaiian depopulation primarily to infertility, and that in turn to "changed habits of life".⁸² His next pages draw an analogy to the infertility of animals in captivity. He seems to be saying that what we would now call a psychosomatic reaction to changed conditions induces sterility. His discussion of sex ratios comes in a later chapter,⁸³ where his rejection of his own hypothesis that former infanticide of females may produce an inherited tendency to have boys leaves him to conjecture an "unknown law" leading to an "excess of males" in "decreasing races, which have already become somewhat infertile". To attribute an excess of males to changed habits of life would carry the psyche far further into the soma than mere infertility, but that would appear to be the trend of Darwin's thinking on the nature of the "unknown law".

Can Darwin have been wrong in his premise that "The practice of infanticide ceased about the year 1819"?⁸⁴ Literally speaking, he was. Ellis shows that Kuakini's ban was in 1823, and Kuakini's jurisdiction was only the island of Hawaii. The historical evidence is conflicting as to later periods. Even Pukui's protest gives evidence of some persistence two generations before herself. Romanzo Adams in an unpublished paper used the sex ratios in the 1890 census to show that infanticide was most common in 1819-25, 1832-36, and declined thereafter.⁸⁵ Only post-partum infanticide after the baby's sex is known could affect the sex ratio. The historic evidence that infanticide was aimed predominantly at females is scanty, and none suggests that girls were the sole victims. Assume that two girls were killed to one boy, and work out the number of children that had to be killed to account for the actual numbers in the Ewa census of 1840, of 491 boys to 318 girls. It would take the murder of 519 living children, 173 boys and 346 girls, with a total population being 2792 in 1840. This is too many to escape notice. Lest it should be objected that this 18 year old group includes those born as far back as 1822, look at Northern Kauai for 1847, with 157 boys to 126 girls under 5. Infanticide would have to have killed 87 if it alone accounted for the difference. Or take the year in which there were 1720 Hawaiian boys aged 4 and under and 1612 girls. It takes 324 murders in four years (1896-1900) to account for that difference. Surely someone would have noticed. The failure to do so cannot be explained by saying that it was

taking place in remote areas far from the prying eyes of the missionaries and government. What statistics are available for secret valleys like Kalalau show a healthy crop of boys and girls. The clandestine massacre, if it existed, was most acute at and around the seat of government and the headquarters of the missionaries. In the latter half of the century, many Hawaiians were acutely aware of the decline in population. It goes beyond the limits of credulity to imagine so vast a conspiracy of silence.

We are left to wonder, as did Darwin, about some "unknown law".

NOTES

- ¹ *Autobiography of Charles Darwin*, ed. Francis Darwin (Dover, 1958) pp. 78-9.
- ² I presume these are a fault of handwriting, rather than a deliberate abbreviation. Whether the letter is in Charles Darwin's hand, I cannot say. The body appears to my untutored eye to be in the same hand and pen as the signature and to resemble exemplars in Mea Allan, *Darwin and his flowers*, (New York, n.d.) pp. 92, 117, 152, 161 and in Garin de Beer *Charles Darwin* (N.Y., 1964), Plate 6.
- ³ The Rt. Rev. Thomas Nettleship Staley, Bishop for Honolulu, 1861-1870. Henry Restarick, *Hawaii from the Viewpoint of a Bishop* (Honolulu, 1924), pp. 61, 120. Staley visited England in 1867, resigned in May 1870 soon after his return to Honolulu, and became a parish priest in England, dying Nov. 1, 1898. Restarick *op. cit.* pp. 120-121. The letter was among others addressed to Staley which HHS acquired in 1952 from Mrs. Victor Thompson of Grimsby, Ontario. *HHS Annual Report for 1952*, p. 40.
- ⁴ de Beer, *Charles Darwin*, pp. 279-280.
- ⁵ Charles Darwin, *The Descent of Man* (London 2d.ed., 1874) pp. 203, 275. I have to thank Dr. E. Alison Kay for permitting me to examine her copies of the first (1871) and second editions. Modern readers will find the passages at pp. 547 and 609 of the Modern Library edition of *The Origin of Species* and *The Descent of Man*.
- ⁶ Darwin, *Descent of Man*, (Modern Library) pp. 545-7.
- ⁷ James Cook & James King, *A Voyage to the Pacific Ocean, etc.*, (London, 1784) vol. 3, pp. 128-9. This volume 3 is ascribed on the title page to Capt. King, not Capt. Cook. His method was to estimate the population of Kealahakua Bay at 350 houses, with six persons per house. Throwing in 300 more for the population of the hinterland brought this to 800 per mile of waterfront. "Deducting a quarter for the uninhabited parts" King applied the result to all islands. King's estimate has been almost unanimously criticized as too high. Robert Schmitt, *Demographic Statistics of Hawaii* (Honolulu, 1968) pp. 18-22. It led him to the absurd figure of 4,000 souls on "Oreehoua" [Luhua], a waterless, uninhabitable islet. The only other eyewitness figure is that of William Bligh, master of Cook's ship the *Resolution*, (and later captain of the *Bounty*) made in the margin of his copy of *Cook's Third Voyage*, giving a total of 242,200, with more reasonable figures for the several islands which seem to attempt to allow for their variance in fertility. Schmitt *op. cit.* pp. 20, 42. J. C. Beaglehole, *The Voyage of the Resolution and Discovery* (Cambridge, 1967), pp. cxvii and 620. For Lanai, King estimated 20,400, Bligh 1,000, and Emory, based on an archaeological survey, 3,150. Kenneth P. Emory, *Island of Lanai* (Honolulu, 1969), p. 122. Some recent archaeological evidence suggests that population may actually have begun to decline before Cook; other such evidence the opposite; and the truth may be that population shifted from dry-land fields to irrigated valleys. In any event, no archaeologist has yet ventured conclusively into print.

- ⁸ Romanzo Adams, *Interracial Marriage in Hawaii* (New York, 1937), pp. 4, 8; of Schmitt *op. cit.*, pp. 24-5, 43, 230.
- ⁹ Schmitt *op. cit.*, p. 74. Should part-Hawaiians be included? If resistance to imported diseases is truly genetic, and if resistance is caused by dominant genes, and if non-Hawaiians coming to Hawaii are homozygous as to that gene, then their children will all be resistant, as will three quarters of their grandchildren. If the predominant cause of resistance to imported disease is such genetics, part-Hawaiians should be excluded, because they share their non-Hawaiian parents' immunity. On the other hand, if immunity is conferred on a child by deriving antibodies from the mother (until the child develops his own), then part-Hawaiians should be included with Hawaiians, for most had non-Hawaiian fathers, whose antibodies could not pass on, while their Hawaiian mothers had none to pass on. The latter hypothesis is unlikely to account for population declining for over a century; one would expect Hawaiians who survived the epidemics to have picked up immunity. The former has some support at least as to tuberculosis. In 1914, the Board of Health reported the tuberculosis mortality rate was Hawaiians 66 per 10,000 population, part-Hawaiians 11.2, and the total population 17.3. Quoted Eleanor C. Nordyke, *The Peopling of Hawaii* (Honolulu, 1977), pp. 18-19. By using the population figures in the 1910 census, it appears that the tuberculosis mortality rate for non-Hawaiians must have been about 9.5 per 10,000. However, tuberculosis is only one disease. Infertility, not susceptibility to communicable disease, was the major cause of depopulation. To exclude part-Hawaiians would treat Hawaiians who had part-Hawaiian children as if they had none.
- ¹⁰ Darwin, *Descent of Man* (Modern Library), pp. 609-10.
- ¹¹ *Ibid* (Modern Library), p. 610.
- ¹² de Beer, *Charles Darwin*, p. 89.
- ¹³ de Beer, *Charles Darwin*, p. 172.
- ¹⁴ de Beer, *Charles Darwin*, p. 180.
- ¹⁵ Thomas Steyaert, *Biology* (New York, 1975), p. 46.
- ¹⁶ *Ibid*, p. 65.
- ¹⁷ Robert C. Schmitt, "The Population of Kauai in 1847" in *Hawaii Historical Review: Selected Readings*, Greer ed. (Honolulu, 1969), p. 227.
- ¹⁸ Darwin, *Descent of Man* (Modern Library) p. 610. The sex-ratio can affect fertility in a way that is somewhat obscured by the custom of stating it in numbers of males per 100 females, the use of terms like "excess of males", and the fact that an excess of males does not necessarily result in depopulation. Turn it on its head and think of what actually constitutes a "deficiency of females". If 100 women produce enough girls so that 100 grow up to produce 100 *ad infinitum*, the population will remain stable, regardless of whether they have 50 or 150 brothers, as long as polygamy is socially acceptable, as it was in Hawaii until the 1820's.
- ¹⁹ Darwin, *Descent of Man* (Modern Library), p. 609.
- ²⁰ William Ellis, *Narrative of a Tour Through Hawaii* (n.p., 1826), p. 298, cited in Darwin, *Descent of Man* (Modern Library), p. 609.
- ²¹ *Journal of William Ellis* (Honolulu, 1917), pp. 243-248.
- ²² *Ibid*, p. 329.
- ²³ Hiram Bingham, *Residence of Twenty-One Years in the Sandwich Islands* (Hartford, 1847), pp. 367-369. Bingham, in speaking of the year 1830, uses the past tense, and the table of contents speaks of "The former prevalence of infanticide" p. x. See also p. 578.
- ²⁴ Laura Judd, *Honolulu* (New York, 1880), pp. 34-5, (Honolulu, 1928), pp. 28-9. This chapter is undated, but is bracketed by one dated August 1828 and one about the visit by the *Vincennes*, which was in 1829. Bernice Judd & Helen Lind, *Voyages to Hawaii Before 1860* (Honolulu, 1974), p. 23.

- ²⁵ A. Bishop, "Decrease of the Population", *Hawaiian Spectator*, vol. 1, p. 57 (1838).
- ²⁶ (Armstrong, et al), *Answers to Questions Proposed by His Excellency, R. C. Wyllie*, (Honolulu, 1848).
- ²⁷ James Jackson Jarves, *History of the Hawaiian or Sandwich Islands* (Boston 1844), pp. 92-3.
- ²⁸ David Malo, "On the decrease of population on the Hawaiian Islands", *Hawaiian Spectator*, vol. 2, p. 12; Judd and Lind, *Voyages to Hawaii Before 1860*, p. 23.
- ²⁹ David Malo, *Hawaiian Antiquities* (Honolulu, 1951), p. 70, 116.
- ³⁰ *Kepelino's Traditions of Hawaii*, ed. Beckwith (Honolulu, 1932), p. 142.
- ³¹ Samuel Kamakau, *Ruling Chiefs of Hawaii* (Honolulu, n.d.), p. 234, translation of article in *Ka Nupepa Ku'oko'a*, Nov. 30, 1867.
- ³² *Ibid*, p. 237 (Dec. 7, 1867).
- ³³ John F. Pogue, trans. Charles Kenn, *Moolelo of Ancient Hawaii*, p. 35.
- ³⁴ E. S. C. Handy & Mary K. Pukui, *The Polynesian Family System in Ka'u* (Wellington, 1958), pp. 79-80.
- ³⁵ John Ii, *Fragments of Hawaiian History* (Honolulu, 1963), vii, 48, 19, 59-60.
- ³⁶ Ellis, *Narrative of a Tour Through Hawaii*, pp. 243, 244.
- ³⁷ Compare Cook & King, *A Voyage to the Pacific Islands*, vol. 3, pp. 128-9 (1st ed. 1784) quoted in Schmitt, *Demographic Statistics of Hawaii*, p. 20, with Nordyke, *The Peopling of Hawaii*, Table 2.
- ³⁸ *Roe v. Wade*, 410 *United States Reports* 113 (1973).
- ³⁹ Ellis, *Narrative of a Tour Through Hawaii*, p. 243 quoted *supra*. To find a savage autocrat talking of rights of others may strike an odd note in some ears. Kamehameha, although he had, unlike other Polynesian chieftains, achieved absolute power, was reluctant to disturb Hawaiian traditional institutions. By stressing the right of the father to kill the child, he avoided approving infanticide, a practice which he had personal reason to dislike if, as according to some traditional sources, he had himself nearly been its victim. W. D. Alexander, "The Birth of Kamehameha I", 19th *HHS Report*, pp. 6-8. Cf Jane Silverman, "The Young Paiea", *HJH* 1972, p. 105 n. 7. But Cf. Kamakau, *Ruling Chiefs of Hawaii*, p. 67.
- ⁴⁰ Darwin, *Descent of Man* (Modern Library), p. 609.
- ⁴¹ Jarves, *History of the Hawaiian or Sandwich Islands*, pp. 408-6. The figures are the same in the Boston and London 1843 editions and the Honolulu edition of 1847, but are omitted in 1872. There is a discrepancy as to whether the first census was 1839 or 1840.
- ⁴² I have also numbered the four Kauai districts and rearranged their order. Assuming Wawapuhi is Awaawapuhi, they cover the entire island, running (as I have rearranged them) from Awaawapuhi clockwise round the entire island to Nualolo, which adjoins Awaawapuhi.
- ⁴³ Darwin, *Descent of Man* (Modern Library), p. 609.
- ⁴⁴ The error is Darwin's, not that of his printer's. 4723 divided by 3776 is 125.08.
- ⁴⁵ Darwin, *op. cit.* (Modern Library), pp. 609-10.
- ⁴⁶ Once again, this is no printer's error. The printed ratio is the true ratio of the printed totals in the *Descent of Man*. The error in the totals was, therefore, made in adding them before the ratio was computed.
- ⁴⁷ *Autobiography of Charles Darwin*, ed. Francis Darwin (Dover, 1958), p. 48.
- ⁴⁸ de Beer, *Charles Darwin*, pp. 207-8.
- ⁴⁹ de Beer, *Charles Darwin*, p. 161.
- ⁵⁰ de Beer, *Charles Darwin*, p. 14.
- ⁵¹ *Autobiography of Charles Darwin*, ed. Francis Darwin (Dover, 1958), p. 19.

- ⁵² Darwin, *Descent of Man* (Modern Library), p. 609.
- ⁵³ At p. 203, Darwin refers to a "Mr. Coan, who was born in the islands" and in note 47, says "I owe the census . . . to Mr. Coan, at the request of Dr. Youmans of New York". The Rev. Titus Coan was not born in Hawaii; his son, Titus Munson Coan, M.D. was born in Hilo (*Missionary Album*, (Honolulu, 1969)) pp. 70-71, and later lived in New York, but was definitely not a clergyman. Apparently, Darwin obtained information from both Coans. The "Dr. Youmans of New York" may be the second husband of the widow of William Little Lee, Chief Justice of Hawaii. (*Honolulu Mercury*, vol. 2, p. 353 (March 1930)).
- ⁵⁴ S. Lyman "A record of the earth quates, kept at Hilo, Hawaii" *American Journal of Science*, ser. 2, vol. 7, pp. 264-6. See Kay, *A Natural History of the Hawaiian Islands*, (Honolulu, 1972) p. 621 for the identification of Sarah Lyman as the author.
- ⁵⁵ Bradford Smith, *Yankees in Paradise* (Philadelphia, 1956), p. 313; *Missionary Albums*, p. 106.
- ⁵⁶ John T. Gulick, Lecture to the Punahou Debating Society, April 7, 1853, quoted in A. Gulick, *Evolutionist and Missionary John Thomas Gulick* (Chicago, 1932), p. 118.
- ⁵⁷ A. Gulick *op. cit.*, pp. 233-4. It thus appears that Darwin's interest in the subject began between then and January 1874, when he wrote Staley.
- ⁵⁸ Titus Coan, *Life in Hawaii* (New York, 1882), p. 259.
- ⁵⁹ Restarick, *Hawaii from the Viewpoint of a Bishop*, pp. 69-73. Ralph S. Kuykendall, *The Hawaiian Kingdom* (Honolulu, 1953), vol. 2 pp. 88-89.
- ⁶⁰ Restarick, *op. cit.*, p. 62.
- ⁶¹ Manly Hopkins, *Hawaii, the Past, Present and Future of its Island Kingdom* (London, 1866), p. 373. It is not clear what basis Hopkins had for ascribing to Coan this answer to Question 73 in *Answers to Questions of His Excellency R. C. Wyllie*. It is not part of the paragraph ascribed therein to Coan, but part of the anonymous final paragraphs, which the introductory letter of transmittal says are a summary of the agreed views of the answering missionaries.
- ⁶² Hopkins, *Hawaii etc.*, p. xv.
- ⁶³ Mark Twain's remarks on Staley may be found in Walter F. Frear, *Mark Twain and Hawaii* (Chicago, 1947), pp. 331 and 323-4, 352, 359, 497.
- ⁶⁴ de Beer, *Charles Darwin*, pp. 15-20.
- ⁶⁵ Hopkin's criticism of the missionaries as casting a pall of joyless gloom over Polyneesian life while only creating superficial morality followed that aimed by F. W. Beechey *Narrative of a Voyage to the Pacific . . . in the Years 1825, 26, 27 and 28* (Philadelphia, 1832), pp. 173, 352-4 and Otto von Kotzebue *A New Voyage Round the World in the Years 1823, 24, 25 and 26* (London, 1830), Vol 1, pp. 150-169, 199-205, 212 u. 2, pp 209, 213-4 at the missions to Tahiti and Hawaii. While Darwin never visited Hawaii, he arrived in Tahiti believing Beechey and Kotzebue, until observation convinced him they were "decidedly incorrect" and made him a vehement defender of the missionaries. Charles Darwin *Journal of Researches. . . During the Voyage of HMS "Beagle"* (London, 1892), pp. 392-3, 403-4. Gulick and Coan were, as we have seen, familiar with this book.
- ⁶⁶ Pacific Anthropological Records, Bishop Museum (Honolulu, 1973).
- ⁶⁷ Schmitt, *The Missionary Censuses of Hawaii*, pp. 12, 18. Obviously, a high sex ratio of male to female adults can cause a small percentage of children in the total population, which is overloaded with males and does not have enough women producing babies. What is remarkable is the correlation of a small proportion of children in the population with a small proportion of girls among the children. For Hawaii, the adult ratio in 1835 was 99.3, children (unfortunately lumped together as such) were 27.8% of the total.
- ⁶⁸ Schmitt, *The Missionary Censuses of Hawaii*, p. 5.

⁶⁹ Schmitt, *op. cit.*, pp. 24–6, reproduces the figures.

⁷⁰ Reproduced in Schmitt, *op. cit.*, p. 46 and discussed in Robert Schmitt “The Population of Northern Kauai in 1847”, *Hawaii Historical Review* Honolulu, 1969), p. 225.

⁷¹ The present trail, popularly regarded as being ancient, was in fact first built by G. F. Wundenberg in 1858. His letter, complaining of not being paid enough, says “The road which I am cutting from Haena to Kalalau, inaccessible formerly except by water, is as difficult a job as any road on the island, extending as it does for about 5 miles on a precipitous pali. All the work I have carried on under my personal superintendence, and I hardly ever leave the men during the time they are at work. All such work as blasting I do with my own hands.” *Letter G. Wundenberg to S. Spencer Chief Clerk, Interior Dept. June 7, 1858 AH*. The “road” of course, is a trail, barely adequate for horses, and much more than five miles in total length. The “five miles” evidently refers only to the portions that had to be cut or blasted out of the “precipitous pali.”

⁷² Probably some of the 12 girls in the 10–20 age bracket were mothers of some under 5’s; and some of the under 20’s had lost their mothers. Nevertheless, it is close to a ratio of two children surviving well into childhood for each mother.

⁷³ Schmitt, *Demographic Statistics of Hawaii*, p. 39. Sir George Simpson of the Hudson’s Bay Company, quoted Duncan “Kanaka World Travellers and Fur Company Employees” HJH vol. 7 pp. 104–5 estimated 4000 Hawaiians a year left Hawaii in 1842. T. Morgan, *Hawaii, A Century of Economic Change* (Cambridge, 1948), p. 148 n. 21 quotes the *Polynesian* (April 4, 1846) as putting the figure at 700 shipped in 1845.

⁷⁴ Morgan, *Hawaii, A Century of Economic Change*, pp. 225–6.

⁷⁵ Charles Lewis *David Glasgow Farragut* Annapolis, 1941), p. 77. William Kanui was 11 or 12 when he went to sea, Thomas Hopu 12 and Henry Opukahaia 15. Susan Bell “Hawaii’s Prodigal” HJH vol. 10, p. 27. Hopu was a cabin boy, but Opukahaia a “sailor”. Hopu, “Memoirs of Thomas Hopoo” HJH, vol. 2, p. 44.

⁷⁶ Schmitt, *The Missionary Censuses of Hawaii*, p. 46.

⁷⁷ Little can be learnt of earlier years. Turnbull, who visited Hawaii in 1803, asserts that John Young told him that women outnumbered men. Turnbull, *A Voyage Round the World in the Year 1800, 1801, 1802, 1803 and 1804* (London, 1805), vol. 2 p. 68. If so, the “excess of males” was not a permanent feature, but appeared after the exploitation of the commoners in the sandalwood trade, the abolition of the *kapu*, and the appearance of a substantial number of foreign residents and foreign ways of life. This would tend to substantiate Darwin’s hypothesis that changed habits of life produced infertility and an excess of males. Turnbull also referred to “the absence from Owyhee of the horrid practice of infant murder” *loc. cit.*, a statement I would once again like to accept as providing a little positive evidence for my wish to believe that infanticide was prevalent only among “courtiers”, in times of famine, or in other special circumstances. However, these statements are sandwiched between ones on the same page that the Hawaiians “were confessedly cannibals [sic] at the time of their discovery” and that at Tahiti women “are not reckoned to amount to more than one tenth part of the population”. Individually, Turnbull’s statements about the excess of females could be accepted. This statement about the total absence of infanticide could be interpreted as evidence of its rarity; this statement about cannibalism is an uncritical acceptance of the statements interpolated in Cook’s *Third Voyage*, vol. 2, pp. 210–214 (purportedly from the lost third volume of Anderson’s journal) but rebutted by King in the third volume pp. 69, 132–4, which would be excusable in an armchair philosopher, though less so in Turnbull who did visit Hawaii. Women not being “reckoned” to be more than one-tenth of Tahiti’s population could be dismissed as acceptance of an exaggerated second hand guesstimate. Taken together, they cast grave doubts on Turnbull’s reliability as an observer or make one note that he does not attribute any of these statements to his own direct observation.

⁷⁸ Schmitt, *Demographic Statistics of Hawaii*, pp. 72, 74. The ratios for 1849 are based on figures in *The Polynesian*, Nov. 10, 1849.

⁷⁹ Nordyke, *The Peopling of Hawaii*, Table 4 b.1.

⁸⁰ Nordyke, *op. cit.* Table 3. A high sex ratio, since it actually means too few women, can be a factor causing depopulation, and an evening out of the sex ratio among the newborn can, therefore, tend to stabilize the population a generation thereafter, but not immediately.

⁸¹ The 1839-40 figures for Northern Kauai can also be compared to the figures for later years for the same district, quoted in Schmitt, *Missionary Censuses of Hawaii*, p. 45. The ratio for adults is 123.63 in 1839-40, 120.45 in 1846 and 106.38 in 1847. For children, the respective figures are 111.55 (under 14), 126.33 (age unspecified) and 125.21 (under 10). However, the ratio for the 10-20 age group is 97.45. The 153 boys and 157 girls in that group (except for in-migrants) should have been part of the 309 boys and 277 girls under 14 in 1839-40. This looks like a substantial out migration, especially of boys. Whalers had reached an all time peak of 596 ships in 1846. Morgan, *Hawaii, A Century of Economic Change*, pp. 524-5. If so, the lower sex ratio for adults in 1847 may be attributable to out-migration.

⁸² Darwin, *Descent of Man* (Modern Library), pp. 546-7.

⁸³ *Ibid.*, pp. 596-611.

⁸⁴ *Ibid.*, p. 609.

⁸⁵ Adams, Romanzo. Unpublished and untitled manuscript, pp. 129-130. Romanzo Adams Collection, Department of Sociology, University of Hawaii.